National Air Quality Forecast Capability: Status and Plans

March 31, 2003

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Outline

- Background: Vision
- Planned Capabilities
  - *Initial Operating Capability*
  - *NOAA and EPA Responsibilities*
  - *National AQ Forecasting*
- Path to Implementation
- March 2003 Status

National Air Quality Forecasting

Vision and Strategy

Vision

National Air Quality Forecast System which provides the US with ozone, particulate matter and other pollutant forecasts with enough accuracy and advance notice to take action to prevent or reduce adverse effects

Strategy

Work with EPA, State and Local Air Quality agencies and private sector to develop end-to-end air quality forecast capability for the Nation

National Air Quality Forecasting
Planned Capabilities

Initial: 1-day forecasts of ozone (O_3)

- *Develop and validate in Northeastern US within 2 years*
- *Deploy Nationwide within 5 years*

Intermediate (5-7 years):

- *Develop and deploy nationwide capability to forecast particulate matter (PM) concentration*
  - Particulate size $\leq$ 2.5 microns

Longer range (within 10 years):

- *Extend air quality forecast range to 48-72 hours*
- *Include broader range of significant pollutants*

National Air Quality Forecast Capability

Major Components

NWP Model:	***NOAA/NWS***
AQF Model:	***NOAA/OAR*** ***EPA/ORD***
Emissions Inventory: **National Emissions**	***EPA/OAQPS***
Supporting Comms/IT:	***NOAA/NWS*** ***EPA/OAQPS***

National Air Quality Forecasting
Initial Operational System

Linked numerical prediction system

Operationally integrated on NCEP's supercomputer :
- *NCEP mesoscale NWP: Eta-12*
- *NOAA/EPA community model for AQ: CMAQ*

Observational Input: NWS weather observations; EPA emissions inventory

Gridded forecast guidance products

Delivered to NWS Telecommunications Gateway and EPA for users to pull

Verification basis

EPA ground-level ozone observations

Customer outreach/feedback

State and Local AQ forecasters coordinated with EPA

Public and Private Sector AQ constituents

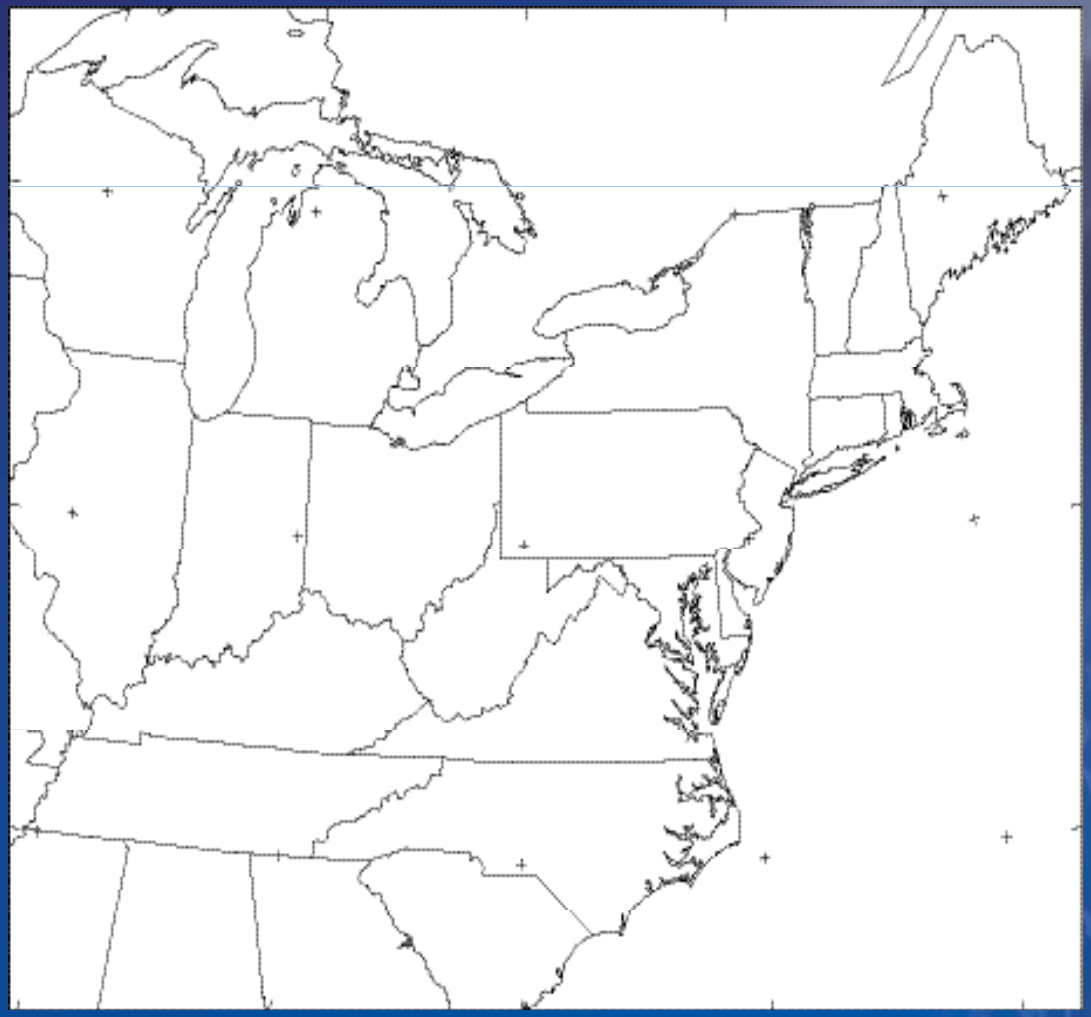
Initial Operating Capability (IOC)

1-Day ozone forecasts: Target deployment 9/15/04 for NE US

- *1-hr and 8-hr avg O_3 levels: categories for EPA and in parts per billion (ppb)*
- *Threshold: Surface level. Objective: 2 vertical levels, TBD*
- *Delivered 2X daily*
  - Primary forecasts for following day: delivered by 1730 UTC
    - *valid for 24 hours through 4 UTC, day 3*
  - Update forecasts for current day: delivered by 1300 UTC
    - *valid for 15 hours through 4 UTC, day 2*
  - Threshold: through 4 UTC. Objective: through 12UTC

Proposed Initial Operational Domain

December 2002



IOC Production Cycle

- Primary forecasts: 1730 UTC (for next day);

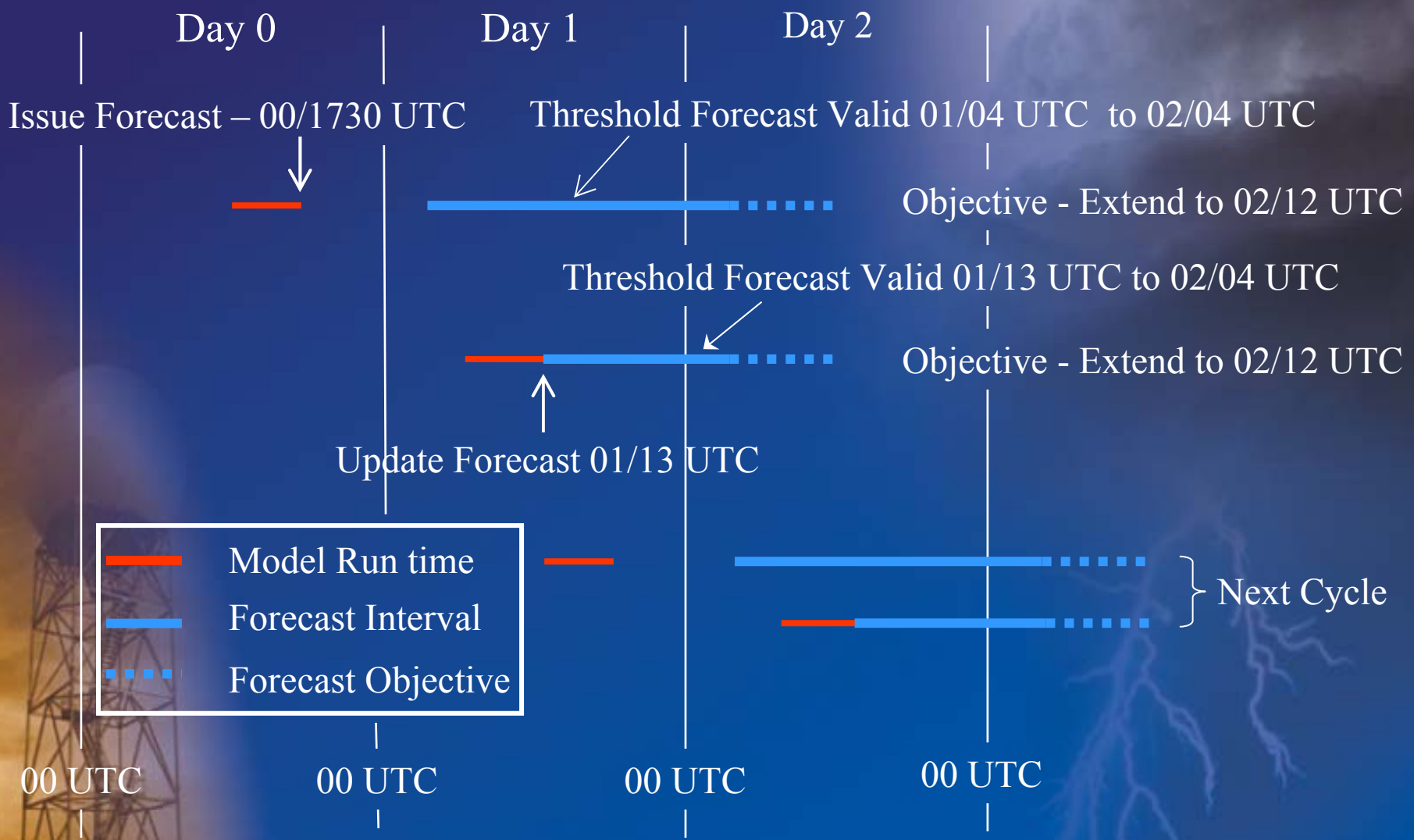
  Updates: 1300 UTC (for morning update to current day)

- Threshold: through 4 UTC

  Objective: through 12UTC

- Process steps/schedule outlined (next slide)

IOC Production Cycle



IOC: NOAA's IT Links

AQ Data from S/L Agencies

EPA Data Management Center

O_3 Movies/ Forecasts

NOAA National Center for Environmental Prediction

Weather Obs

EPA Emissions Inventory

Commercial Weather Providers

Data "pull" - - ->
Data "push" ——>

Predicted Pollutant Concentration Fields

Media

City-specific AQI forecasts

State/Local Air Agencies

Public

EPA's Role: IOC

- Compile, maintain, and provide current National Emissions Inventory to NOAA
  - *Updates approx every 3 years*
  - *Consists of S/L and federal inventories; including fixed point/area and mobile sources, biogenic sources*
- Compile and maintain National AQ Databases
  - *Includes ozone observations*
  - *Current data (ozone and other precursors) delivered to NOAA within (2) days*
- Compile databases for S/L AQ Forecasts
- Make AQ Forecasts available to States/Locals and private sector
  - *Produce AQI and links to public health information*
- Provide AQ forecasting support for all products
  - *Staffs required customer help desk*

NOAA's Role: IOC

- Develop and integrate tools for weather and AQ forecasting
  - *Eta/WRF*
  - *CMAQ*
  - *Verification and Archiving*
  - *Underlying IT for NOAA side of interface*
- System operations: AQ prediction models driven by NCEP weather prediction models
- Provide AQF guidance products to EPA twice daily
- Provide AQF guidance on NWS Gateway servers
  - *available for public and private sector users to "pull"*
- Verification
- Archiving
- Customer Outreach/feedback

IOC: Success Criteria

Forecast Performance Accuracy:

Threshold target: critical level "hit accuracy" predicted on 90% of days

- Propose: Objective: critical level "hit accuracy" predicted on 93% of days
- Persistence forecast "hit accuracies" are ~85%

On-time delivery

Forecasts provided on schedule: at least XX%

- Propose: 95%

Initial Operating Capability

Responsibilities and Schedule: Development, Testing, Integration

Task	Lead	Dates	Status
Model Development	NOAA/NWS and NOAA/EPA/ORD	09/02 – 05/03	G
Acquire IT Resources	NOAA/NWS	02/03 – 09/03	Y
Model Integration	NOAA/NWS and NOAA/EPA/ORD	04/03-06/03	G
Model Testing	NOAA/NWS	06/03 – 09/04	G
Initial: Test products to focus group		06/03 – 09/03	G
Final go/no go decision		09/04	G
Develop/implement required verification	NOAA/NWS and NOAA/EPA/ORD	10/02 – 06/04	G
Develop required product archiving	NOAA/NWS	04/03 -- 09/04	G

Key: Complete | On schedule | At risk | Remedial Action Required

IOC Risks

Schedule	Probability	Impact	Strategy	Status
CMAQ adaptation achieving speed, accuracy goals	*M*	*H*	*Assess benchmark speed (4/03, 6/03 upgrade):* *Platform-specific optimizations; Model simplifications as necessary* *Assessment/ Evaluations:* *Early design (2/03), Focus group (9/03), Retrospective for Summer 2002 (10/03)*	G
Qualified staff needed NCEP for testing/integration by 4/03	*M*	*H*	*IBM consultant on board; new hires arriving 4/03-5/03*	Y
HPCC resources need to be acquired and integrated at NCEP by 06/03	*H*	*H*	*OST/PPD expediting steps to ensure additional processors are ready* *HPCC integration – testing scheduled 5/03*	Y

Key: Complete B | On schedule G | At risk Y | Remedial Action Required R

Longer-term Risks

	Probability	Impact	Strategy
Schedule			
CMAQ adaptation achieving speed, accuracy goals: for National domain	*M*	*H*	*Following 2003 testing: further optimization for speed; further development to increase accuracy*
Cost			
Additional resources needed to extend capability to PM and other pollutants	*H*	*H*	*FY 05 budget request*
Technical			
RT air-chemistry obs may be needed	*M*	*M*	*Ingest RT obs into operations; further development of BC/IC*

National Air Quality Forecast Capability

Beyond IOC: Goals/Targets to FY 12

- Near-Term: Initial Operating Capability (IOC)
- Mid-Term (YR 5): Initiate nationwide forecasting
- Longer-term (YR 10): Enhanced capabilities

Proposed Products	*2-year Target*	*5-year Target*	*10-year Target*
Ozone forecasts	IOC 1-day forecasts: Northeast US	1-day forecasts for the Nation	Extend to day 2 and beyond
PM	R&D	1-day forecasts: Northeast US	1-day forecasts for the Nation
Extend to other pollutants		R&D	1-day forecasts

Issues

- **Public/Private sector relationship**
  - *Continuing outreach to strengthen interactions*
- **Forecaster-in-the-Loop**
  - *Trials being planned to assess benefit*
- **Current program plan does not include HPCC hardware for Air Quality Forecast model backup at NCEP mirror site**
  - *Working with OCWWS to assess need and provide recommendation*

Status: March 2003

- Ozone forecasting: NOAA & EPA Planning for IOC in NE US
  - *Models being adapted for linked operations at NCEP*
  - *Necessary SP Hardware acquisition in progress*
  - *IT architecture being developed for testing/ evaluation of AQF model system in 2003*
  - *Integrated customer focus team to evaluate Summer 2003 testing*
  - *RTT&E in Summer 2004 - - >> commissioning by September, 2004*
- Extension to Nationwide within five years
- Extension to PM initiated within five years
- EPA-NOAA Partnership: Essential for AQF
  - *Overarching MOU ready for signature*
    - Demonstrates interagency cooperation and collaboration
    - More specific MOA for AQF in draft and proceeding